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**Abstract of the Invention**

The present application provides a method for identifying the presence of a transgene of a genetically modified organism in a sample wherein the nucleic acid sequence of the transgene is replicated and detected as the release of PPi from the deoxynucleotide triphosphate precursors consumed in the replication reaction. This pyro luminescent detection system can be applied qualitatively or quantitatively to detect the presence of a specific transgene in a target DNA sample such as sample containing DNA from a genetically modified organism.